

REMARKS

This amendment is in response to the Office Action of May 19, 2005. In the Office Action, the Examiner rejected claims 1-4, and 6.

The Examiner first rejected claims 1-4 and 6 under 35 USC §102 as being anticipated by *Hoffman et al.* '535.

Hoffman describes a dryer with a housing for drying conveyed materials having an entrance 16 and an exit 17 for the conveyed materials. This patent is particularly addressed to the design of infrared temperature sensors 60 held within housings 50 (col. 5, lines 47-col. 6, line 10).

The drying in *Hoffman* is substantially accomplished by using forced air heating provided by combustion in a burner and using two blowers. These components are mentioned but not shown. An intake blower and an inline blower are positioned within or adjacent the housing. One blower draws fresh air into the system to mix with the gas for burning and the second blower moves the heated air into the heating area above the conveyor. The first opening 26 is for the heated air. The forced air is exhausted through openings 29 below the conveyor. Heater elements 22 are identified but not described.

Regarding claim 1, *Hoffman* does not describe the baffle arranged to distribute air from the inlet cavity to the air passages or the series of orifices sized to provide an air impingement on a substrate to be dried as claimed in claim 1. Regarding claim 2, *Hoffman* does not disclose a plurality of air distribution systems mounted within a single enclosure, wherein each distribution system is connected to the means for receiving pressurized air and the means

for receiving electrical power, wherein each distribution system receives, heats, and disperses the pressurized air. Regarding claim 3, *Hoffman* does not disclose a thermocouple mounted to a thermal conducting slide plate in contact with the materials being dried. Regarding claim 6, *Hoffmann* does not disclose a plurality of orifices formed through a wall of a housing to allow air to pass from the internal cavity to the exterior of the housing, and a baffle within the internal cavity for distributing air along the length of said heater.

Applicants assert that this rejection has been overcome and requests withdrawal of the rejection of claims 1-4 and 6.

The Examiner next rejected claims 1-4, and 6 under 35 USC §103(a) as being unpatentable over *Platsch* '788 in view of *Platsch* '318.

Claim 1 describes an electrical heater mounted within the internal construction of the housing, and a baffle arranged to distribute air from the inlet cavity to the air passages. *Platsch* '788 does not describe such an arrangement. *Platsch* '788 describes a pipe distributor element 24 that blows cooling air from a fan 100 through nozzles 32, 34. There is no baffle disclosed. The heating is done by an external radiant heater 44. *Platsch* '318 describes resistive heating elements 60 wherein the air flows axially within the elements along the axis of elongation. There is no baffle disclosed. Neither reference meets the description in claim 1.

Claim 2 describes a plurality of air distribution systems mounted within a single enclosure, wherein each distribution system is connected to a means for receiving pressurized air and a means for receiving electrical power, wherein

each distribution system receives, heats, and disperses pressurized air. *Platsch* '788 does not disclose that the plurality of distribution systems are mounted in a single enclosure. In fact *Platsch* '788 teaches that it is preferred that the radiant heat drier strips are mounted in a frame at a distance from one another which is large compared with the width of the distributor elements . (col. 2, lines 13-16). This would teach away from assembling a block of distributor systems as shown in Figure 6 and 7 of the present invention. *Platsch* '318 also does not disclose a plurality of distribution systems mounted in a common enclosure.

Claim 3 describes a thermocouple mounted to a thermal conducting slide plate in contact with the materials being dried. Neither *Platsch* '788 nor *Platsch* '318 disclose this arrangement.

Claim 6 describes a baffle within the internal cavity for distributing air along the length of the heater. Neither *Platsch* '788 nor *Platsch* '318 disclose this arrangement.

Applicants assert that this rejection has been overcome and requests withdrawal of the rejection of claims 1-4 and 6.

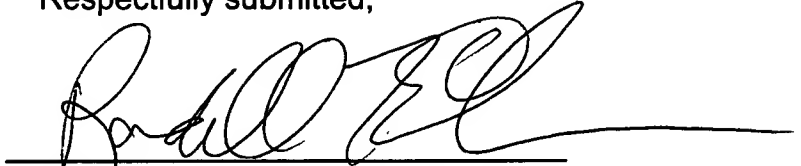
Applicant has added new dependent claims 7-20 that also describe patentable inventions.

Applicant brings to the Examiner's attention that the pending application Serial Number 10/791,066 which was referred to in the information disclosure statement filed on August 20, 2004 has now issued as U.S. Patent 6,931,205, a copy of the issued claims attached.

Applicant submits that all claims are in condition for allowance and request
issuance of the application.

Respectfully submitted,

By:

A handwritten signature in black ink, appearing to read "Randall T. Erickson", written over a horizontal line.

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13

3. An air distribution system maintains cool external surface temperatures while simultaneously integrating the heat source directly into the air distribution system at the immediate vicinity of the discharging forced air.

4. A control system for both air flow and air temperature is integrated directly with the dryer system so as to provide a convenient means for the operator to make adjustments to either the air flow setting or temperature setting or both at the dryer location. The integration of the control system into the dryer eliminates the need for the operator to make said adjustment(s) from an inconvenient remote location.

5. The heat source is mounted within the air distribution plenum providing the most efficient means of utilizing the power from the heat source for the purpose of drying. The air is heated just before it is dispersed through the air release orifices onto the web. By combining the heat plant into the air distribution plenum, the unit is very compact, requires fewer parts, and is less expensive to manufacture.

6. When the dryer system is operated in a gaseous environment, the control box enclosure can be gasket sealed and lightly pressurized to achieve a purged environment within the control box enclosure. The lightly pressurized air is provided as a by-product of the relieving pressure regulator under normal operating conditions.

7. A slide plate is used to provide even support to the web as the web passes through the dryer. The slide plate has a hinge and latch configuration that allows the press operator a convenient means to rock the slide plate back out of the way for manual threading of the web through the dryer during machine set up, or for maintenance access to clean the air distribution assemblies.

8. Solid cartridge heaters are available with various power levels in the same cylindrical geometry. A conveniently located bulkhead plate with a threaded port is used to mount the solid cartridge heater in the air distribution system. This provides the press operator with a means to readily change out solid cartridge heaters with different power levels for different processes and application.

9. The effective drying temperature of the dryer is measured using a temperature sensor that is mounted to a metallic slide plate that is in contact with the web. The temperature of the metallic slide plate essentially stabilizes at the temperature of the web, due to the contact with the web, and will provide the operator with a more accurate measurement of the effective drying temperature of the process. This can greatly reduce set up time and maintain quality on repeat jobs.

10. Solid cartridge heaters are available with variable power densities along the axial length of the solid cartridge heater. The variable power densities can be used to create hot or cold spots in specific intervals or in specific areas along the width of the dryer to counteract uneven flow patterns past the solid cartridge heater or to meet specific process or application requirements.

From the foregoing, it will be observed that numerous variations and modifications may be effected without departing from the spirit and scope of the invention. It is to be understood that no limitation with respect to the specific apparatus illustrated herein is intended or should be inferred. It is, of course, intended to cover by the appended claims all such modifications as fall within the scope of the claims.

What is claimed is:

1. A forced hot air drying unit, comprising:

an elongated housing with an air inlet and an internal cavity, said air inlet open into said internal cavity to allow pressurized air to enter said internal cavity, a

14

plurality of air outlets arranged spaced apart along a length of said internal cavity to allow air to pass from said internal cavity to the exterior of said housing; and a heater mounted within said internal cavity of said housing, said heater being elongated along an axis, and said internal cavity and said housing configured to channel pressurized air through said internal cavity in directions substantially perpendicular to said axis.

2. The drying unit according to claim 1, wherein said plurality of outlets comprises a plurality of orifices.

3. The drying unit according to claim 1, wherein said heater comprises a solid cartridge heater.

4. The drying unit according to claim 1, wherein said heater comprises a heating element and a heat transfer body that includes heater fins, said heat transfer body having a contact surface that is in heat transfer communication with said heating element.

5. A forced hot air drying unit, comprising:

an elongated housing with an air inlet and an internal cavity, said air inlet open into said internal cavity to allow pressurized air to enter said internal cavity, a plurality of air outlets arranged spaced apart along a length of said internal cavity to allow air to pass from said internal cavity to the exterior of said housing;

a heater mounted within said internal cavity of said housing;

wherein said heater comprises a heating element and a heat transfer body that includes heater fins, said heat transfer body having a contact surface that is in heat transfer communication with said heating element; and

wherein said internal cavity is partly defined by undulating side walls of said housing that form circuitous air paths with said heater fins.

6. The drying unit according to claim 1, wherein said housing comprises an elongated, substantially hollow body having open ends and two end plates which substantially close said open ends, and said heater comprises an elongated heating element that is mounted to one end plate and extends into said internal cavity.

7. The drying unit according to claim 6, wherein said air inlet comprises a port located through a wall of said body.

8. The drying unit according to claim 6, wherein said body comprises a substantially rectangular outside profile along a length thereof.

9. The drying unit according to claim 6, wherein said heater comprises a solid cartridge heater.

10. A forced hot air drying unit, comprising:

an elongated housing with an air inlet and an internal cavity, said air inlet open into said internal cavity to allow pressurized air to enter said internal cavity, a plurality of air outlets arranged spaced apart along a length of said internal cavity to allow air to pass from said internal cavity to the exterior of said housing;

a heater mounted within said internal cavity of said housing,

wherein said housing includes opposing side walls that in part define said internal cavity, wherein each said side wall comprises sidewall fins extending toward said heater, and said heater comprises heater fins extending toward said side walls, at least one of said heater fins interposed between two adjacent sidewall fins, said sidewall fins and said heater fins together forming circuitous air flow paths on opposite sides of said heater.

11. The drying unit according to claim 10, wherein said plurality of air outlets are arranged in two columns, each column receiving air from one of said circuitous air flow paths.

15

12. A forced hot air drying unit, comprising:
 an elongated housing with an air inlet and an internal cavity, said air inlet open into said internal cavity to allow pressurized air to enter said internal cavity, a plurality of air outlets arranged spaced apart along a length of said internal cavity to allow air to pass from said internal cavity to the exterior of said housing;
 a heater mounted within said internal cavity of said housing; and
 wherein said heater is configured to have variable power density to provide a substantially constant air temperature of air exiting said plurality of air outlets along the length of said housing.
13. A forced hot air drying unit, comprising:
 an elongated housing with an air inlet and an internal cavity, said air inlet open into said internal cavity to allow pressurized air to enter said internal cavity, a plurality of air outlets arranged spaced apart along a length of said internal cavity to allow air to pass from said internal cavity to the exterior of said housing;
 a heater mounted within said internal cavity of said housing;
 wherein said housing comprises an elongated, substantially hollow body having open ends and two end plates which substantially close said open ends, wherein said body comprises a substantially rectangular outside profile along a length thereof;
 wherein said heater comprises an elongated, solid cartridge heating element and a heat transfer body that includes heater fins, said heat transfer body having a contact surface that is in contact with said heating element, wherein said heater is mounted to one end plate and extends into said internal cavity; and
 wherein said hollow body includes opposing side walls that in part define said internal cavity, wherein each said side wall comprises sidewall fins extending toward said heating element, and said heater fins extend toward said side walls, at least one of said heater fins interposed between two adjacent sidewall fins, said sidewall fins and said heater fins together forming circuitous air flow paths on opposite sides of said heater.
14. A forced hot air drying unit for drying inks, paints or other coatings, comprising:
 a means for receiving pressurized air;
 a means for receiving electrical power;
 a plurality of drying units that each receive, heat, and disperse said pressurized air, each of said drying units comprising an electric heater for heating the air;
 a means for controlling the flow of said pressurized air passing through said drying units, said means for controlling the flow includes an air flow regulator; and
 a means for controlling the temperature of the air passing through said drying units, said means for controlling the temperature includes a modulating power electronic temperature controller, wherein said drying units, said means for controlling the flow, and said means for controlling the temperature are located in a single enclosure.
15. The drying unit according to claim 14, wherein said inks, paints or other coatings are on a web, and said means for controlling the temperature comprises:
 a thermocouple mounted to a thermal conducting slide plate in contact with the web;

16

- a thermocouple mounted in a location where the web has already been exposed to the majority of the resident time of the drying unit; and
 a thermocouple being capable of attaining the temperature of the web.
16. An air distribution system for a forced hot air drying unit, comprising:
 an enclosure;
 at least one housing, said housing having an air inlet to allow pressurized air to enter said housing, an internal cavity, and an outlet to allow air to pass from said internal cavity to the exterior of said housing;
 an electric heater mounted within said internal cavity of each said housing;
 at least one control for influencing the amount of forced air drying; and
 wherein said at least one housing and said control are contained within said enclosure.
17. The system according to claim 16, wherein said control comprises a heater control for controlling air temperature.
18. The system according to claim 16, wherein said control comprises an air pressure regulator connected to a source of pressurized air and to said air inlet.
19. The system according to claim 16, wherein said at least one housing comprises a plurality of housings, each housing having an air inlet to allow air to enter said housing, an internal cavity, an outlet to allow air to pass from said internal cavity to the exterior of said housing; and one said electric heater is mounted within said internal cavity of each said housing; and said system comprises an air distribution path including a manifold located within said enclosure that is air flow connected to all air inlets of said housings, and a common air inlet open to said manifold and connectable to a source of pressurized air on an outside of said enclosure.
20. The system according to claim 19, comprising a common electrical connector, wherein each heater within each said housing has an electrical connection that is connected to said common electrical connector, said common electrical connector being connectable to a source of electricity on an outside of said enclosure.
21. The system according to claim 19, comprising a common electrical connector, wherein each heater within each said housing has an electrical connection that is connected to said common electrical connector, said common electrical connector being connectable to a source of electricity on an outside of said enclosure; and
 wherein said outlets of each said housing comprises a plurality of openings spaced apart along a length of each said housing, wherein said housings are arranged side by side with said pluralities of openings facing a common direction, and wherein said enclosure is configured to place said pluralities of openings adjacent to an object to be dried.
22. The system according to claim 16 wherein said electrical heater is elongated along an axis and said housing and an inlet are configured such that air flows in a direction perpendicular to said axis.
23. The system according to claim 22 wherein said electric heater has a length along said axis substantially equal to said internal cavity.